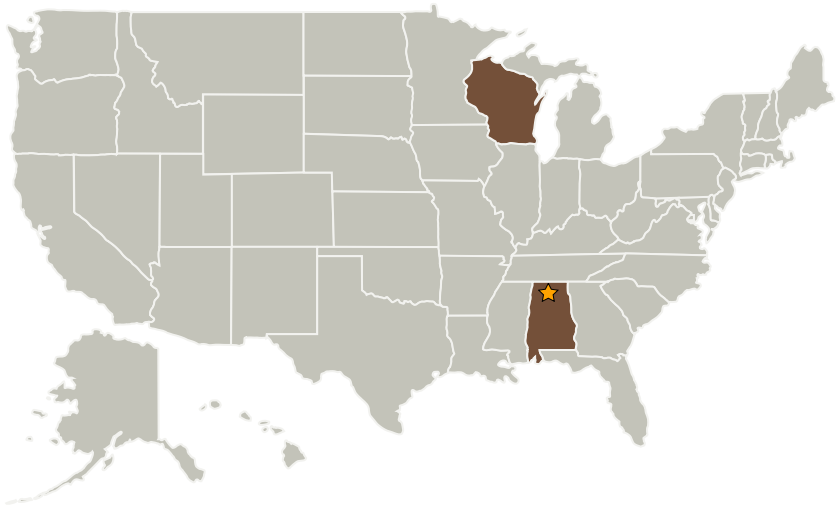
Dense Medium Plasma Water Purification Reactor (DMP WaPR), Phase I

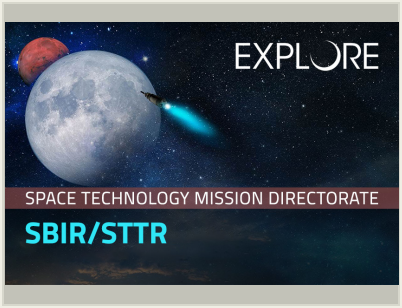
Completed Technology Project (2006 - 2006)

Project Introduction

The Dense Medium Plasma Water Purification Reactor offers significant improvements over existing water purification technologies used in Advanced Life Support systems such as bioreactors, catalysts, and membrane based systems. Evaluation of water contaminated with bacteria and plasma-treated indicates that, prior to any optimization of the DMP reactor, contamination levels can be reduced by up to 99.9%. Organic contaminant concentrations (benzene, toluene, ethyl benzene, xylene) can be reduced below the detectable range. The DMP reactor is more energy efficient than other Advanced Oxidation Techniques and does not contain expendable materials or produce toxic side products. The atmospheric-pressure plasma is initiated and sustained through a large number of micro-discharges between a rotating pin-array electrode and a stationary electrode. The plasma breaks down organic compounds via the generation of OH? and H? free radicals through interaction at the gas-liquid boundary. The DMP reactor uses non-equilibrium, low temperature, atmospheric-pressure plasmas for the volume-plasma-processing of liquid-phase compounds (water-based solutions). This Partial Discharge (PD) plasma is considered a highly localized electrical discharge produced across an insulating medium, typically between two electrodes. Characteristics of a PD are highly dependent upon electrode geometry and operational parameters and, therefore, require significant research for optimization into a NASA ALS setting.

Primary U.S. Work Locations and Key Partners





Dense Medium Plasma Water Purification Reactor (DMP WaPR), Phase I

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Dense Medium Plasma Water Purification Reactor (DMP WaPR), Phase I

Completed Technology Project (2006 - 2006)

Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Orbital Technologies Corporation	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Madison, Wisconsin

Primary U.S. Work Locations	
Alabama	Wisconsin

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.3 Resource Processing for Production of Mission Consumables